XVI. *On the* Pelorosaurus; *an undescribed gigantic terrestrial reptile whose remains are associated with those of the Iguanodon and other Saurians in the Strata of Tilgate Forest, in Sussex.*

By Gideon Algernon Mantell, *Esq., LL.D., F.R.S., F.L.S.,*
Vice-President of the Geological Society, &c.

Received November 22, 1849,—Read February 14, 1850.

I HAD for a long while entertained the idea that among the fossil remains collected from the Wealden deposits of the South-East of England, there were indications of an enormous Lizard entirely distinct from the Iguanodon, Megalosaurus, Cetiosaurus, and other genera which have been named and more or less accurately determined; and I have at length obtained such evidence in support of my opinion, as induces me to submit to the Royal Society the data which appear to establish the existence of a terrestrial reptile contemporary with the Iguanodon, and which equalled, if not surpassed in magnitude, that colossal herbivorous Saurian.

I shall not on the present occasion enter upon those minute anatomical details which are indispensable for the solution of many of the difficult problems which but too often perplex and bewilder the palæontologist, but content myself with faithful descriptions and figures of such facts as will suffice to establish my proposition; in the hope that these guesses at truth, which recent investigations have suggested to my mind, may serve to direct future labourers in the right path of inquiry, and tend to enlarge our knowledge of that remarkable fauna which prevailed in the islands and continents of the Cretaceous, Wealden, and Oolitic ages.

The occurrence of very large isolated vertebræ, and portions of femora with medullary cavities, indicating animals of terrestrial habits, and of great size, and which, though assigned to the Cetiosaurus, could not properly be included in a genus of aquatic marine reptiles with solid bones like the Cetaceans, first suggested to me the probability of there having existed another genus of Saurians contemporary with those previously mentioned, and to which some of the supposed Cetiosaurian remains might belong. This idea, though vague, seemed to offer an explanation of certain discrepancies between some of my statements and those of other cultivators of this branch of comparative anatomy.

The stupendous humerus or arm-bone of a terrestrial reptile from the strata of Tilgate Forest, in Sussex, which I have now the honour to place before the Royal Society, will, I believe, establish the correctness of that opinion.

This splendid fossil was obtained from the locality in which was situated the

quarry represented in the frontispiece of my work on the Geology of the South-East of England, and that yielded to my early researches the teeth of the Iguanodon and numerous other highly interesting remains. The bone was imbedded in the fawn-coloured sandstone that prevails in the Wealden of that part of Sussex, at the depth of 25 feet beneath the surface of the soil. The distal part of the bone, to the extent of 2 feet, was discovered in 1847, by Mr. PETER FULLER of Lewes, and some months afterwards the middle portion was found at a higher level; a line of fault having traversed the rock and imbedded bone, and occasioned the subsidence of the portion previously met with. At length other fragments were discovered and extricated from the rock, and the whole replaced and cemented together in the admirable state in which the fossil now appears, by the intelligent collector in whose possession I had, a few weeks since, first the gratification of seeing this unique and stupendous relic from the Weald of my native county*.

This bone is the right humerus, and bears a closer resemblance in its general character to the analogous element in the Crocodile, than to that of the Lacertians. It is $4\frac{1}{2}$ feet long, and 32 inches in circumference at the distal extremity. It is in the ordinary state of mineralization of the bones from the Wealden sandstones, being of a rich umber colour, and very heavy from an impregnation of oxide of iron. The surface presents a smooth appearance, but upon close inspection is found to be finely striated: it evidently belonged to an animal arrived at maturity, but not aged†.

The inferior or distal end, and nearly three-fourths of the shaft, are perfect; but a considerable part is wanting on each side the proximal extremity. Fortunately the base of the salient deltoid process, so characteristic of the humerus in the Crocodiles, is well-defined (Plate XXI. fig. 1^b *c*), and affords grounds for supposing that the upper part, which is deficient, did not materially differ from the recent type.

The transverse fracture through the middle of the shaft (Plate XXI. fig. 1^a *f*) has been left disunited, to show the large medullary canal which is filled up with concreted sand; as is usually the case in the long bones of the Iguanodon from the same locality.

The thickness of the wall of the shaft at this section (Plate XXI. fig. 1^c) is 1 inch; the transverse diameter of the medullary cavity 3 inches. Mr. FULLER informs me that the canal extended to within one-third of the head of the bone, as in the femur of the Iguanodon.

The fossil, in its general form, is straighter than the humerus of the Crocodile, and the depressions between the condyles, both anteriorly and posteriorly, are relatively shallower. The surface for articulation with the fore-arm (Plate XXI. fig. 1 *b*) is

* I cannot refrain from expressing my warmest thanks to Mr. FULLER, for the gratifying compliment paid me (though a personal stranger) as the original explorer of the Geology of Sussex, in allowing me to possess this interesting fossil, although he had previously refused several liberal offers.

† Thin sections of the bone exhibit under the microscope the intimate structure beautifully preserved; the bone-cells, and Haversian canals, are as distinct as in recent bones.

smoother and more uniform, but as the epiphyses are wanting, and both extremities of the bone somewhat abraded by attrition, I am led to conclude that in the recent state, the radio-ulnar articulation must have closely resembled the crocodilian type.

In the posterior aspect (Plate XXI. fig. 1^b), the double bend or curve so strikingly conspicuous in the shaft of the crocodilian arm-bone, is wanting; the deltoid ridge (Plate XXI. fig. $1^b\,c$) commences much lower down, and above the fractured end of this process (fig. $1^b\,c$) the bone expands into the wide flattened head, for articulation with the glenoid socket, formed by the union of the coracoid and scapula. Although the general character of the fossil corresponds in so many respects with that of the Crocodile, yet there are such marked discrepancies, that I have not ventured to introduce an outline indicative of the probable form of the parts that are deficient; for there is ample space for the commission of important errors in such a substitution, which might form a stumbling-block to future observers.

To facilitate comparison I have subjoined figures of the right humerus of the recent Gavial, and of the Iguanodon, and Hylæosaurus, reduced to an uniform scale: the arm-bone of the Gavial belongs to a skeleton 18 feet long, in the museum of that eminent physiologist, my friend Dr. Robert Grant.

It will be seen at a glance that the enormous bone under consideration differs essentially from the humeri of all the Saurians with whose remains it was found associated. The large medullary cavity at once separates it from the bones referred to the Polyptychodon and Cetiosaurus; for in these animals the long bones are composed of "coarse cancellous tissue without any trace of medullary cavity*."

These data appear to me sufficient to warrant the establishment of a new genus for the colossal air-breathing reptile to which this remarkable humerus belonged, and I propose the name of *Pelorosaurus*† to indicate the enormous magnitude of the original.

I now pass to the consideration of other parts of the skeleton, or, to express myself more correctly, of certain detached and isolated bones found in the same quarry with the gigantic humerus, and which, for reasons to be stated in the sequel, may with greater probability be assigned to the *Pelorosaurus*, than to any other of the colossal reptiles obtained from the Wealden deposits.

Anterior Caudal Vertebræ of the Pelorosaurus, Plate XXII. and Plate XXIV. and XXV.

The vertebræ which I would assign to the *Pelorosaurus* with but little hesitation, are four anterior caudals of a very remarkable character, which I found many years since in the same stratum as the humerus above described, and at the distance of but a few yards. They were firmly imbedded and lying in various positions in a

* Reports on British Fossil Reptiles, 1841, p. 102. I have a series of bones from Brook in the Isle of Wight, through the kindness of my distinguished friend Sir R. I. Murchison, proving the existence of Cetiosauri in the Wealden; all the long bones are destitute of a medullary cavity.

† Πέλωρ *pelor*, monster, unusually gigantic.

large block of sandstone, and I succeeded, after much labour, in clearing them from the stone with their processes nearly entire; in the progress of my task a chevron bone of the crocodilian type, 10 inches long (Plate XXII. fig. 8), was laid bare and extricated.

When these splendid fossils were first discovered, I referred them to the Iguanodon; subsequently they were named by Professor Owen *Cetiosaurus brevis**; and lastly, Dr. Melville and myself, in my Memoir on the Iguanodon†, suggested the necessity of adopting a different specific appellation, and proposed that of "*Conybeari*;" we were unwilling to remove them from the genus Cetiosaurus, till corroborative evidence was obtained to justify the change.

The description of these vertebræ in detail will be found in the British Association Reports for 1841 (p. 97), and by Dr. Melville in the Philosophical Transactions, 1849 (p. 296); but without figures no adequate idea can be given of the originals‡. I have therefore annexed delineations on a reduced scale, $\frac{1}{4}$ *linear*, Plate XXII., and two views of the largest vertebra $\frac{5}{8}$ths the natural size, Plate XXIV. and XXV. I have been induced to add the two last drawings in order that the subject may be fully comprehended.

These vertebræ are distinguished by the subquadrangular form of the articulating facets of the centrum or body, and the relative shortness of the antero-posterior diameter (Plate XXII. fig. 7). The largest is $7\frac{1}{2}$ inches in the transverse, and $6\frac{3}{4}$ inches in the vertical diameter of the anterior face, and but 6 inches in the posterior: the length or antero-posterior dimension is but $3\frac{1}{2}$ inches. The height to the top of the spinous process is 13 inches. The diameter of the neural canal, for the spinal marrow, is 2 inches. The other three bones are somewhat smaller; the most distal being only 6 inches transversely.

These vertebræ are slightly concave in front, and almost flat behind; the upper part of the anterior face being the deepest, as shown in Plate XXII. fig. 5^a. The sides of the body are concave, both lengthwise and vertically, with a transverse median convexity, as seen in Plate XXII. fig. 5^a.

The inferior surface of the centrum (Plate XXII. fig. 6) is slightly concave in its antero-posterior diameter, and divided by a longitudinal sulcus into two ridges, whose terminations obscurely indicate the position of the hæmapophysial articulations. It is noticeable, that in vertebræ of such magnitude, well-defined articulating spaces for the chevron bone are not present.

The neural arch presents the most peculiar characters; it is large, and anchylosed to the anterior half of the upper surface of the centrum; the posterior part of which is left free, as shown in fig. 5^c and 7, Plate XXII. The anterior oblique processes

* These vertebræ and the chevron bone, are placed in the same case as the bones of the Iguanodon, in the Gallery of Organic Remains of the British Museum.

† Philosophical Transactions, 1849, p. 297.

‡ Sir J. G. Dalyell very properly remarks, that "delineation should be the inseparable accompaniment of description in natural history."

(Plate XXII. fig. 5^a, *g*, *g*) project directly forwards, and advance over the exposed part of the body of the contiguous vertebra (Plate XXII. fig. 7); as there are no posterior oblique processes, the anterior are received in depressions on each side the spinous process (see Plate XXII. fig. 5 and 7 *h*, *h*). The transverse processes (*f*, *f*) are very strong and short, and project at nearly right angles from the body; the spinous process (*e*) is short and thick.

In Plate XXII. fig. 7, the four vertebræ are represented in a consecutive line, for the purpose of explaining the mode of articulation above described, but it is doubtful whether the two posterior bones are in their natural position; it seems probable that there was an intermediate vertebra between the second and third, and between the third and fourth, so that two more would be required to complete the series. The hæmapophysis or chevron bone, Plate XXII. fig. 8, is obviously too small for articulation with either of the above vertebræ; it is however important, as showing the crocodilian modification of this caudal element of the gigantic original.

Median caudal vertebræ, Plate XXIII. fig. 1 and 3, and Plate XXVI.—From the same quarry I obtained two vertebræ belonging in all probability to the middle part of the tail; and which, though scarcely large enough to appertain to the same individual as the above anterior caudal, present such characters as might be expected in the more distal part of the same region. The centrum of the largest specimen (Plate XXIII. fig. 10 and Plate XXVI.) is $7\frac{1}{4}$ inches long; the transverse diameter of the anterior face is 5 inches, the vertical $4\frac{1}{4}$ inches; height to the top of the spine $5\frac{1}{4}$ inches. Both the facets of the centrum are slightly concave, and are most deeply excavated in the upper part, as in the large anterior caudals. The neural arch is anchylosed to the anterior half of the body, the posterior part being uncovered. The inferior surface (Plate XXIII. fig. 10^a *c*) is concave antero-posteriorly, and two slightly elevated ridges terminate behind in distinct hæmapophysial surfaces (*k*, *k*), which are $1\frac{3}{4}$ inch apart, and are evidently fitted for articulation with a chevron bone of the type already described (Plate XXII. fig. 8).

Distal caudal vertebra, Plate XXIII. fig. 11.—In referring the unique caudal here figured to the same category as the preceding, I offer the suggestion as only probable. The centrum is of a subcylindrical form, $4\frac{1}{2}$ inches long, and slightly concave on both facets. The most remarkable feature in this bone is the anchylosis or rather confluence of the heads of the chevron bone with the body (Plate XXIII. fig. 11 *j*, *j*), a character common in fishes, but which, I believe, is unknown in reptiles, save in one genus, the fossil animal of Mæstricht, the Mosasaurus, whose occurrence in the English chalk was first ascertained in 1820, by my discovery of two concavo-convex caudals with confluent chevron bones*. The remarks of the illustrious Cuvier on the caudal vertebræ of the Mosasaurus, are in every respect applicable to the specimen under consideration. After mentioning the median caudals as having "*à leur face inférieure deux petites facettes pour porter l'os en chevron*," he describes the more

* Geology of the South Downs, Plates XXXIII. and XLI.

distal series which form a great part of the tail; in these "*l'os en chevron n'y est plus articulé, mais sondé, et fait corps avec elles**."

The structure of the spinal column of the Mosasaurus therefore proves that vertebræ having the chevron bone articulated by two distinct facets (as Plate XXII. fig. 8), may be followed, in a more distal part of the caudal region, by a series with the hæmapophysis anchylosed to the centrum (as in Plate XXIII. fig. 11).

Femora and Tibiæ.—From the Wealden strata of Tilgate Forest, Hastings, and the Isle of Wight, I have seen fragments of the distal extremity of femora with medullary cavities, which, though too imperfect to admit of accurate determination, were obviously those of a gigantic terrestrial reptile, distinct from the Iguanodon and Megalosaurus.

From Sandown Bay, in the Isle of Wight, I have the proximal end of a tibia of enormous size, the circumference of the head of the bone being 34 inches, a magnitude surpassing that required for a tibia to articulate with the largest known femur, and presenting such deviations in form from the tibiæ of the Iguanodon, as to render it highly probable that this bone belonged to the *Pelorosaurus*.

Indications of the Pelorosaurus in the Oolitic strata.—The general accordance of the terrestrial fauna and flora of the Oolitic period, (as proved by the remains of land animals and plants imbedded in the fluvio-marine deposits of that formation,) with those of the Cretaceous and Wealden, renders it probable that vestiges of most, if not all, of the genera and species of land reptiles that occur in the latter will be found in the former strata. Thus as the Iguanodon, Pterodactyles, with Clathrariæ and Dracænæ, are found in the Chalk, and the Megalosaurus, with Cycadeæ and Coniferæ, in the Wealden, traces of the *Pelorosaurus* may be expected to occur in the Oolite. To ascertain this fact, I availed myself of the liberal permission of my friend the Dean of Westminster to examine his splendid collection, and I repaired to Oxford and diligently inspected the numerous specimens of Saurian remains which it contains, especially those from the Wealden and Oolite.

To avoid prolixity I will but remark, that among immense quantities of huge vertebræ and bones of the extremities of unequivocally marine Saurians, as proved by the cancellated structure of their centres, and which had been properly referred to Pliosaurus, Cetiosaurus, &c., there are portions of femora, vertebræ, and tarsal phalangeal and ungueal bones, which appear to be distinct from those of any established genus. I refer especially to several caudal vertebræ resembling that from Tilgate Forest (Plate XXIII. figs. 9 and 10), which are probably of the *Pelorosaurus*, and large curved claw-bones, from 4 to 6 inches long. These were found at Chipping Norton, associated with vertebræ, &c. of Cetiosaurus, and were accordingly assumed to belong to the same genus of reptiles.

But the specimens which come more immediately within the scope of this inquiry are portions of femora from Enstone, which appear to differ from those of the Mega-

* Ossemens Fossiles, tome v. p. 327. Edit. 1824.

losaurus and Iguanodon. They belong to a huge terrestrial reptile, in which the *patellar* space is smooth, and not traversed by a deep furrow as in the femur of the latter. The structure of these fossils led me to examine with great care the enormous femur obtained by Mr. STRICKLAND from the Bradford clay at Enslow Bridge, on the Charwell, eight miles from Oxford. This specimen is now affixed to the wall in Dr. BUCKLAND'S museum, at a considerable height from the floor, and therefore cannot be examined with facility. Unfortunately too the bone was found in so shattered a condition that it was necessary to cement its anterior face to a board. The posterior surface pressed flat, the condyles and popliteal space, and the outline of the sides of the shaft, are therefore the only characters now displayed; the proximal extremity or head is wanting. This bone exactly corresponds in length and width with the humerus of the *Pelorosaurus*. The condyloid extremity is the only portion in a normal state. The condyles (so far as I could ascertain from an elevated and inconvenient position on a ladder) are more equal, and wider apart, than in the Iguanodon and Megalosaurus; but the general appearance of the bone is so similar to that of the femur of the Iguanodon when shattered and pressed flat, that until I ascertained there were no indications of a median trochanter on the mesial border of the shaft, I could not convince myself it did not belong to that reptile. There were no visible traces of a medullary cavity, yet it seemed improbable that the shaft of this enormous and strong bone could have admitted of the degree of compression it had sustained, (for the entire thickness did not appear to exceed 3 or 4 inches,) if it was solid as in the Cetiosauri: Dr. BUCKLAND entirely concurred in this opinion.

To ascertain this important point I wrote to Mr. STRICKLAND, who very obligingly favoured me with an immediate reply. In answer to my inquiries, Mr. STRICKLAND stated, that upon comparing the femur with that of the Megalosaurus, it was evident that it belonged to a different genus: and he had labelled it "*Cetiosaurus*," from its resemblance to portions of femora and other bones found in the same locality, and so named in the Oxford Museum; and likewise, because in the crushed mass of bony fibre which filled the interior, he did not perceive any traces of a medullary cavity; but it is quite possible, Mr. STRICKLAND adds, "that such a cavity may have existed, though now so much obliterated by compression as to have escaped my observation."

The character of the condyloid extremity, and the general form of this bone, appear to me to separate it from the femur of the marine reptiles, to which it has been referred, provisionally, by this distinguished naturalist; if upon a more accurate examination a medullary cavity should be detected, there will be strong grounds for assigning this gigantic thigh-bone to the *Pelorosaurus*; on the contrary, if the shaft should prove to be solid throughout, the supposed relation of this femur to the humerus previously described, will of course be negatived.

Summary.—From the facts described he following inferences result:—

1st. Upon the evidence of the humerus alone, the existence during the Wealden

æra, of a stupendous terrestrial Saurian, generically distinct from any previously described; this reptile I propose to name *Pelorosaurus Conybeari.*

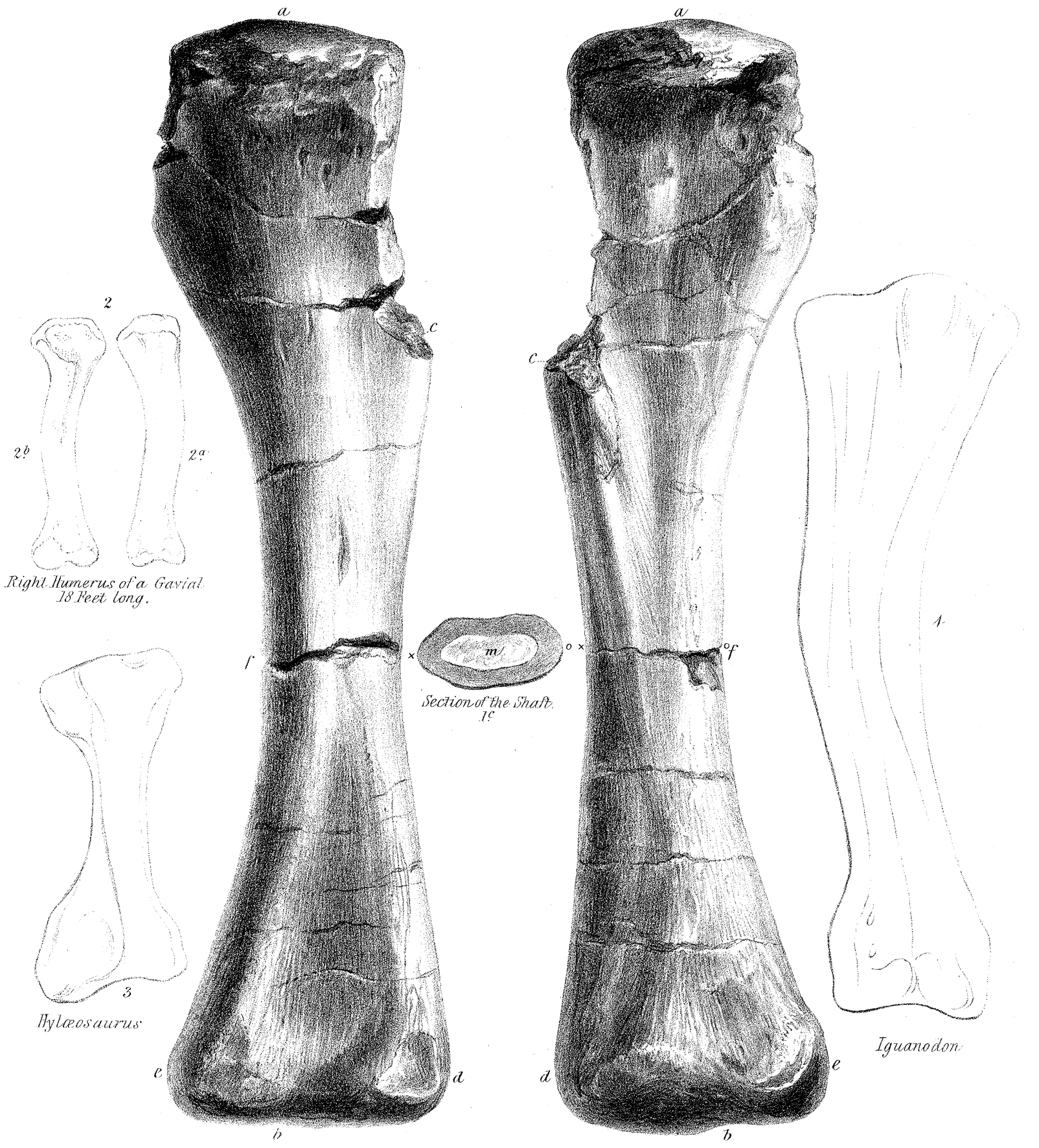
2ndly. The great probability that the four large anterior caudal vertebræ with the chevron bone, termed *Cetiosaurus brevis* by Professor OWEN, and the two median caudals found in the same stratum as the humerus, and at no great distance from it, belong to the same species; and

3rdly. That certain large bones of Saurians from the oolitic deposits of Oxfordshire, at Enstone and at Enslow Bridge, and hitherto considered as Cetiosaurian, may appertain to the Pelorosaurus.

It may perhaps be expected that some estimate should be given of the probable magnitude of the reptile to which the humerus belonged; but calculations of the length and proportions of the original animal taken from a single bone, or from a few detached bones, can afford but vague and unsatisfactory results. With the view, however, of conveying some idea of the almost incredible bulk of the *Pelorosaurus,* it may be stated, that in the Gavial or Gangetic Crocodile, the length of the humerus is equal to one-eighteenth of the entire length of the animal from the snout to the end of the tail; thus in Dr. GRANT'S specimen the humerus is 1 foot long; the entire skeleton 18 feet. Computed by this standard the length of the Pelorosaurus would be 81 feet, and the girth of its body about 20 feet. But if we assume the length and number of the vertebræ as the scale, we should have a reptile of relatively very abbreviated proportions; but in either case, a Saurian far exceeding in size all living types, and equalling if not surpassing in magnitude the most colossal of the extinct forms.

From what has been advanced, we perceive that every addition to the zoology of the countries that flourished during the secondary geological ages, affords proof of the high development of the terrestrial reptiles, which appear to have enjoyed the same predominance in those ancient faunas, as the large Mammalia in those of the tertiary and human epochs. The trees and plants associated with the remains of the extinct Saurians, manifest by their affinity to existing forms, that the countries in which they grew possessed as pure an atmosphere, as high a temperature, and as unclouded skies, as those of our tropical climes. There are, therefore, no legitimate grounds to support the hypothesis that during the "Age of Reptiles"—the period when the reptilian class most prevailed—the earth was "in the state of a half-finished planet," and its atmosphere too heavy from an excess of carbon, for the respiration of warm-blooded animals! Such an opinion can only have originated from an imperfect view of the phenomena which these problems embrace. There is as great a discrepancy between certain existing faunas and those of modern Europe, as that presented by the Wealden: for example, those of Australia, Tasmania, New Zealand, and the Galapagos Islands.

By a singular coincidence, on the same day that I obtained the humerus of the *Pelorosaurus* from Tilgate Forest, I received from my eldest son in New Zealand, the most interesting collection of the remains of the extinct gigantic birds of those

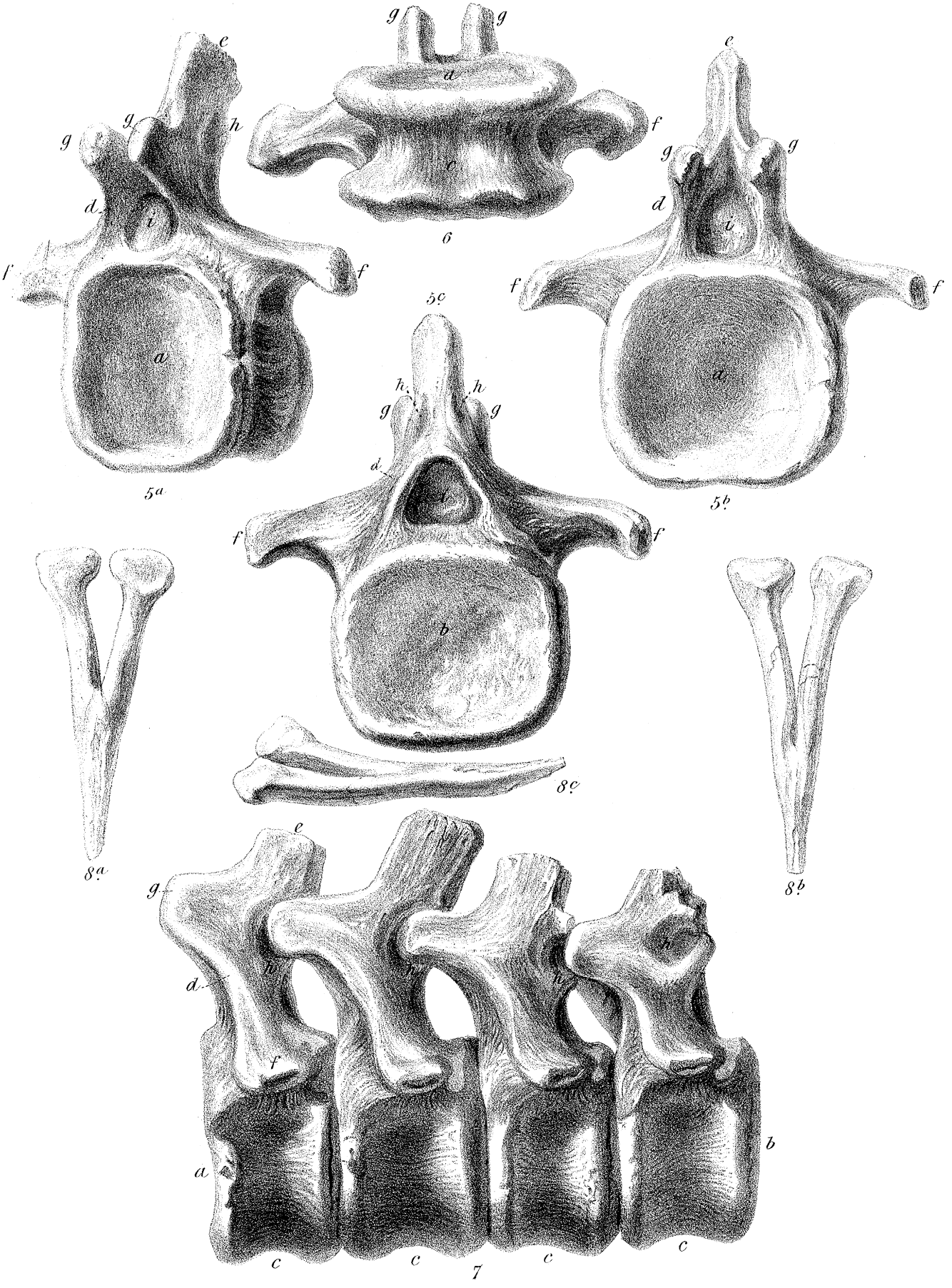


Right Humerus of Pelorosaurus Conybearei.

(1/6 linear the natural size.)

J. Dinkel del.

G. Scharf lith.



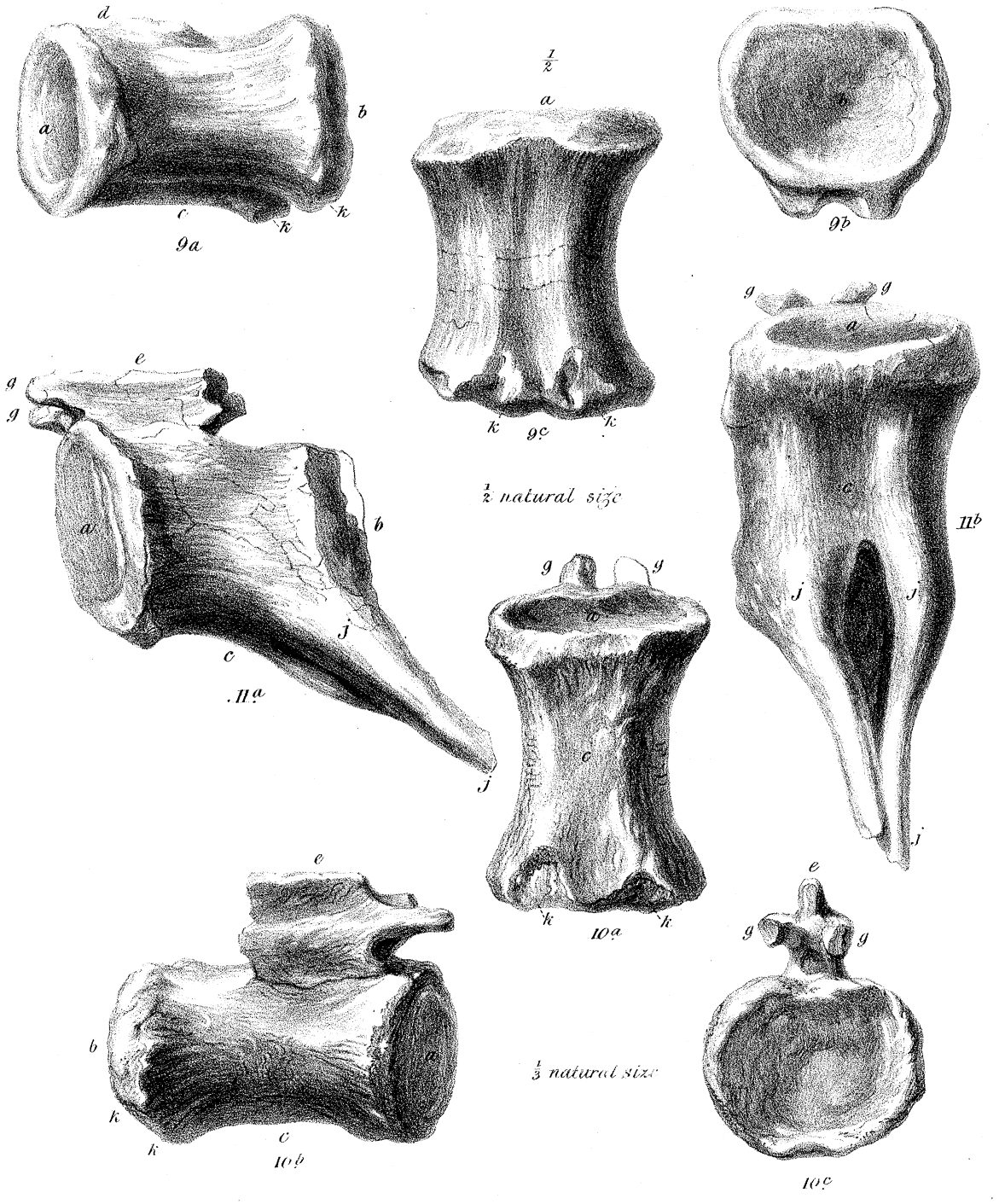
Caudal Vertebræ of Pelorosaurus Conybearei.

From the Strata of Tilgate Forest.

(¼ linear the natural size.)

J. Dinkel del.

G. Scharf, lith.



Saurian caudal Vertebræ, from the strata of Tilgate Forest.

J. Dinkel. del. Printed by J. Basire C. Scharf. lith.

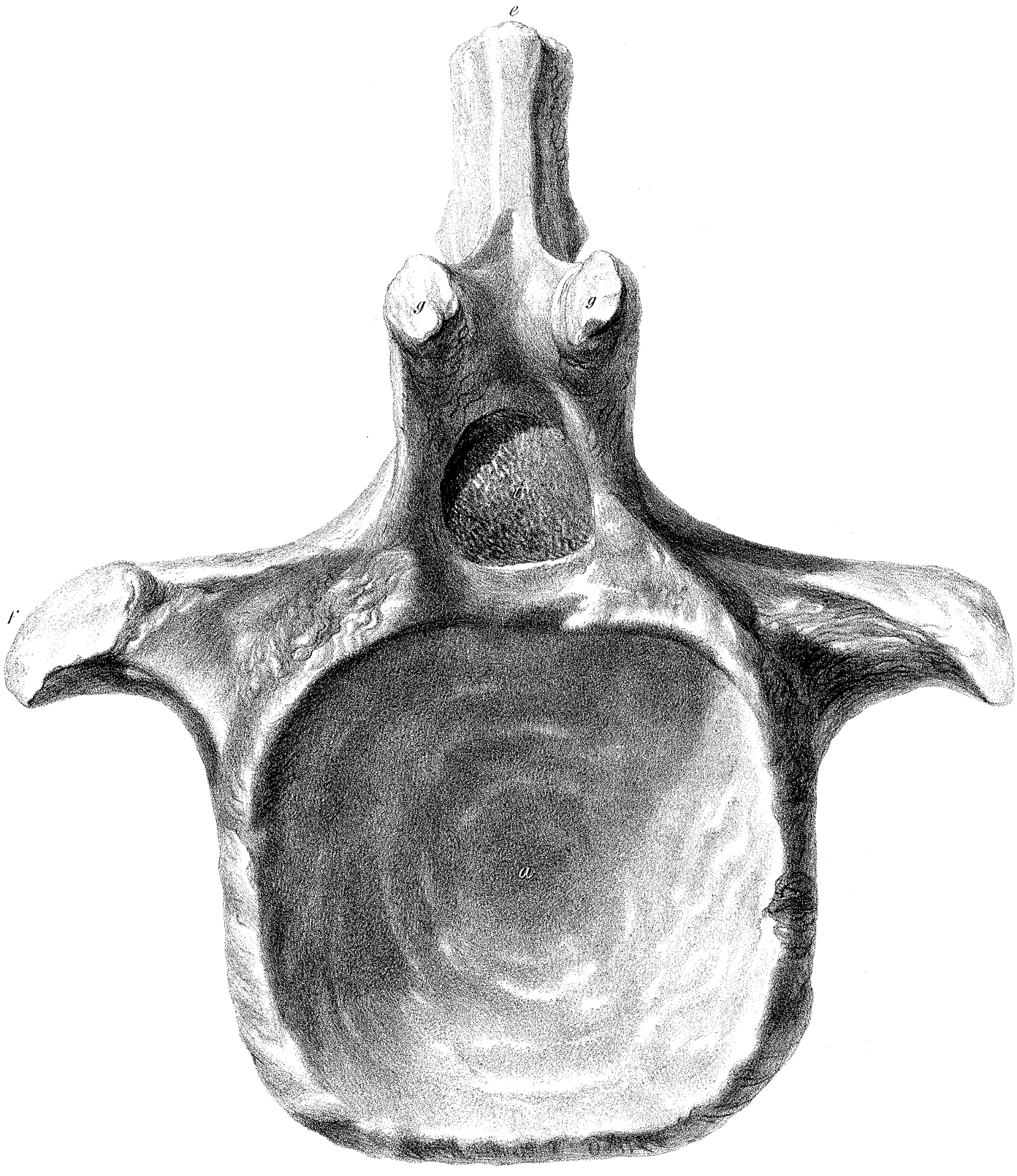
Caudal Vertebra of Pelorosaurus Conybearei.

(5/8 Natural Size)

J. Dinkel del.

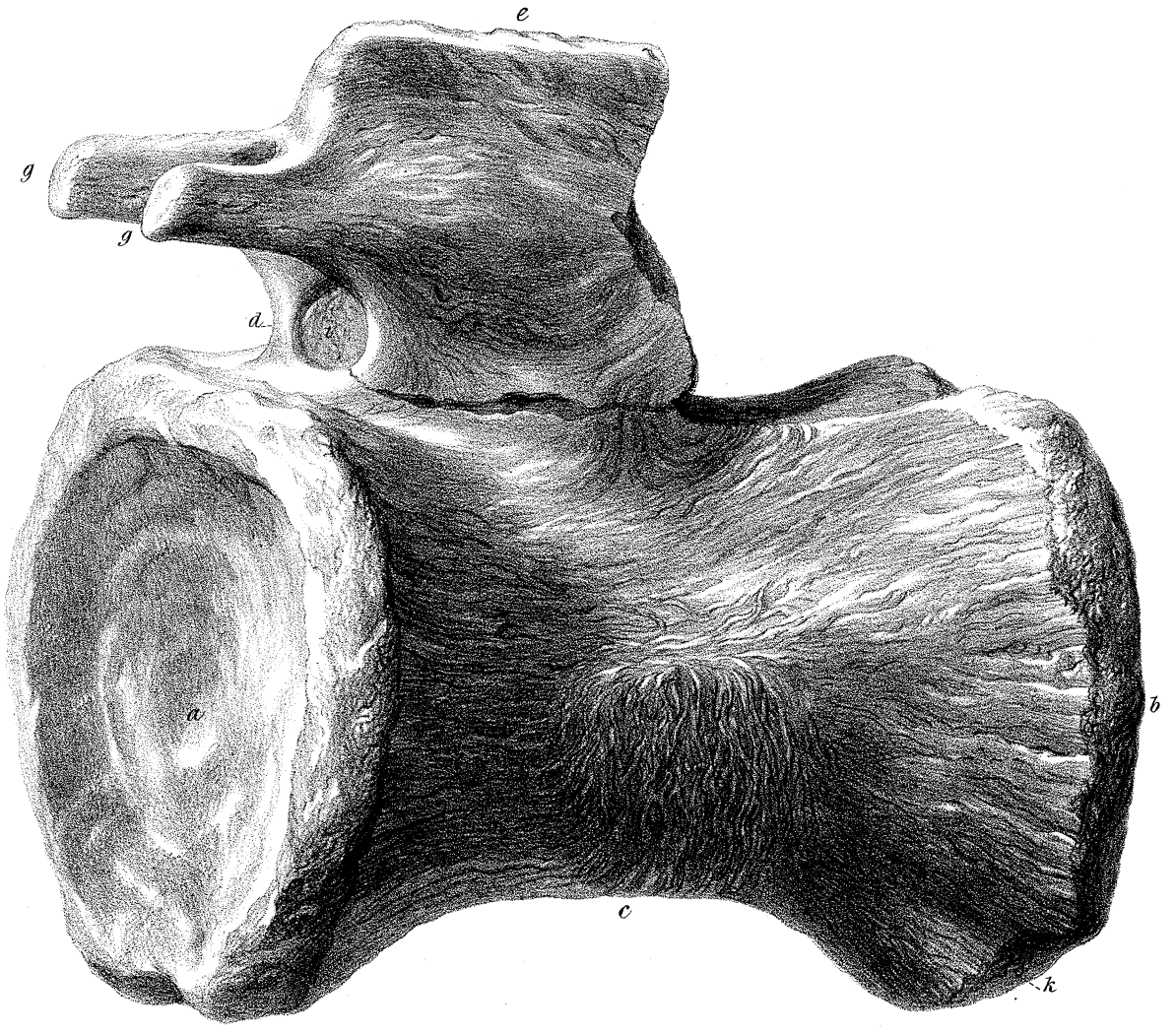
G. Scharf lith.

Printed by J. Basire



Anterior view of a caudal vertebra of Pelorosaurus Conybearei.
(⅜ Natural Size)

J. Dinkel, del.
Printed by J. Basire.
G. Scharf, lith.



Median caudal Vertebra of Pelorosaurus (?)
from the strata of Tilgate Forest, by Cap.n Lambart Brickenden.
(Natural Size.)

J. Dinkel, del.

G. Scharf, lith.

Printed by J. Basire.

islands that has reached this country: and I could but think, that had the respective localities and periods of these birds and reptiles,—both of a size far surpassing all other known types of their respective classes,—been interchanged, and the bones of the Dinornis of New Zealand referred to the Wealden epoch, what speculations would in all probability be hazarded to account for physical conditions assumed to be required by so marvellous a development in numbers and magnitude of the class Aves, to the almost entire exclusion of the Mammalia!

In attempting to explain the natural records of the ancient physical history of the globe and its inhabitants, by our acquaintance with the physiology, anatomy, and economy, of existing organic beings, we cannot be too often reminded of the caution of the sagacious QUETELET, that "our knowledge and our judgments are in general only founded on probabilities more or less great, which it is very important, but very difficult, to estimate at their just value."

In conclusion I would beg to remark, that in adding another genus of terrestrial reptiles to those previously established as belonging to the Fauna of the Wealden, I am fully aware of the imperfect manner in which, from various unavoidable causes —especially the pressure of professional duties—my investigations have been carried out. But encouraged in my earliest researches by the illustrious founder of Palæontology, Baron CUVIER, and honoured by the highest award of the Geological Society, I felt reluctant to discontinue researches which no other naturalist seemed disposed to undertake, lest some important additions to our knowledge of the ancient physical condition of the earth and its inhabitants should be unrecorded and forgotten.

Chester Square, Pimlico,
November 1849.

DESCRIPTION OF THE PLATES.

PLATE XXI.

*** The figures of this Plate are all on the same scale, which is $\frac{1}{6}$ linear the natural size.

Fig. 1. The right humerus of the *Pelorosaurus Conybeari*, obtained from the strata of Tilgate Forest in Sussex, by Mr. PETER FULLER of Lewes, and now in the possession of the author.

1[a]. Anterior view.

1[b]. Posterior view.

1[c]. Transverse section of the shaft; *m*, the medullary canal filled with fawn-coloured sandstone.

it is important to preserve faithful representations taken whilst the specimens are fresh from the stratum, for when the clay contracts by drying, the delicate shelly structure of the phragmocone but too frequently shrivels and flakes off; I know of no means by which this decomposition can be prevented, and am therefore desirous of adding to the illustrations of this communication the accompanying drawing, by Mr. MOUNSEY, of the beautiful fossil above mentioned, in which are shown the elongated processes of the phragmocone in their natural position on each side the dorsal line; the interval between them is occupied by a thin pellicle of a dark integument marked with very fine diverging parallel striæ; this substance is probably the inner lining of the capsule of the sepiostaire in a carbonized state, a condition in which animal tissues so often occur in argillaceous deposits.

I likewise annex a drawing of another specimen (Plate XXIX. figs. 9, 10) of the distal termination of the osselet of the *Belemnoteuthis*, in which the alveolus or hollow occupied by the chambered shelly cone is exposed; the cavity is filled with calcareous spar, and is surrounded by a dense fibrous radiated structure, analogous to that of the osselet of the true Belemnite; an additional proof that in the Belemnoteuthis this investment is the osselet or guard of the phragmocone. After this evidence, the presumed generic identity of the Belemnite and Belemnoteuthis must, I conceive, be abandoned by every accurate observer; consequently the form and structure of the body and arms, and other soft parts of the Cephalopoda to which the Belemnites belonged, have yet to be discovered.

DESCRIPTION OF THE PLATES.

PLATE XXVIII.

Fig. 1. Outline of a remarkably fine specimen of a Belemnite with the phragmocone and its elongated processes, from the Oxford Clay, Wilts. In the British Museum. The length of the original is 22 inches.

Fig. 2. Represents the basilar or upper portion of the above fossil of the natural size.
e. The right, and *f*. the left process.
x, *x*, *x*. The base of the process spread over the conical shell of the phragmocone.

PLATE XXIX.

Fig. 3. Part of the phragmocone of a Belemnite from the Lias, in the collection of JOHN MORRIS, Esq.
3ª. Lateral view of a portion of the same, showing the remains of one of the longitudinal processes on the shell of the phragmocone.

Fig. 4. Outline exhibiting all the known parts of the Belemnite in their relative position, the osselet being split asunder longitudinally, and one side removed to show the situation of the alveolus, &c.

e. Spinous process.
f. Transverse process.
g. Anterior oblique process.
h. Depression on the spinous process, occupying the usual situation of the origin of the posterior oblique.
i. Spinal canal.
j. Chevron bone or hæmapophysis.
k. Hæmapophysial surfaces for articulation with the chevron bone.

Fig. 6. A vertebra seen on the inferior aspect.

Fig. 7. Four anterior caudal vertebræ placed in a consecutive series.

Fig. 8. A chevron bone 10 inches long, found imbedded in the same block of sandstone as the vertebræ.
8*a*. Outer aspect.
8*b*. Inner aspect.
8*c*. Lateral view.

PLATE XXIII.

*** The figures are $\frac{1}{2}$ linear the natural size.

Median and distal caudal vertebræ of the Pelorosaurus?

Fig. 9. A median or distal caudal vertebra with two eminences on the posterior end of the inferior aspect of the body, to articulate with a double-headed chevron of the crocodilian type.
9*a*. Lateral view.
9*b*. Posterior face.
9*c*. View of the inferior surface.
k, *k*. The articulating facets to unite with the chevron bone.

Fig. 10. A larger vertebra of a similar type, obtained from the same locality in Tilgate Forest as the other specimens figured in this memoir, by my friend Capt. Lambart Brickenden, F.G.S.
10*a*. Inferior surface.
10*b*. Lateral view.
10*c*. Anterior view, showing the neural arch.

Fig. 11. A caudal vertebra with the chevron bone anchylosed to the body, as in the distal caudals of the Mosasaurus.
11*a*. Lateral view.
11*b*. View of the inferior surface.

PLATE XXIV.

Perspective view of the largest anterior caudal, $\frac{5}{8}$th the natural size.

PLATE XXV.

Anterior view of the same.

PLATE XXVI.

Perspective view of a median caudal vertebra of the Pelorosaurus, of the natural size; found in the same quarry and stratum as the specimens figured in the preceding Plates; by Capt. LAMBART BRICKENDEN.